



Monitoring the CO₂ emissions from new passenger cars in the EU: summary of data for 2010

EXECUTIVE SUMMARY

EEA has collected data submitted by Member States on vehicle registrations in the year 2010, in accordance with the Regulation (EC) No 443/2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO₂ emissions from light duty vehicles. Information on Carbon Dioxide (CO₂) emissions and mass of the vehicles were reported by all Member States in order to evaluate the performance of the new vehicle fleet towards the CO₂ emission target (130 gCO₂/km by 2015).

According to the data, the EU27 is improving its performance in terms of CO₂ emissions from passenger cars: average CO₂ emissions are currently 140.3 gCO₂/km, 5.4 gCO₂/km less than in the previous year (145.7 gCO₂/km in 2009). This is the second-largest drop in specific emissions since the beginning of the monitoring scheme.

As observed in the previous years (except 2009), dieselisation of the fleet is continuing. However, the relative benefits of dieselisation are decreasing; the emission gap between diesel and gasoline vehicle (3.3 gCO₂/km) is considerably lower than a decade ago, when the difference was 17 gCO₂/km.

Compared to the last year before the economic recession (2007), vehicle registrations decreased by around 2.3 million in 2010. The majority (95%) of the registration took place in the EU-15. Here a new passenger car emits 7.9 gCO₂/km less than the average vehicle in the EU-12. Compared to the previous year, the decrease of CO₂ emissions from new passenger cars is greater in 2010 in the EU-12 (6.0 gCO₂/km) than in the EU-15 (5.3 gCO₂/km).

The weight of cars increased considerably after a sharp decrease in 2009 and is now back at the level seen in the years prior to the economic crisis. Despite this, advances in vehicle technology helped in improving the fuel efficiency and in cutting the average CO₂ emissions per kilometre travelled.



1. INTRODUCTION

Road transport constitutes about one fifth of the EU's total emissions of carbon dioxide (CO₂). In order to ensure that the EU meets its greenhouse gas emission targets under the Kyoto Protocol, a comprehensive strategy to reduce CO₂ emissions from new cars and vans sold in the European Union was developed.

As part of the EU's strategy, Regulation (EC) No 443/2009 aims at reducing average CO₂ emissions of new passenger cars. The Regulation sets a target value of 130 grams CO₂ per kilometre [g CO₂/km] by 2015 and of 95 g CO₂/km by 2020.

According to Article 8 of the Regulation 443/2009, Member States shall record and annually transmit to the Commission information for each new passenger car registered in their territory. In particular, the following details are required for each new passenger car registered:

- manufacturer name;
- type, variant, version, make and commercial name;
- specific emissions of CO₂;
- weight;
- wheel base; and
- track width.

Additional information, such as fuel type, fuel mode and engine capacity were also submitted.

The data submitted by Member States are considered provisional until confirmed by the Commission on 31st October 2011, following a three months scrutiny period during which manufacturers may notify the Commission of any errors in the data.

The data are required for the calculation by the Commission of the average specific emissions of CO₂ from new passenger cars and for setting the specific emissions targets that shall be met by car manufacturers. The database provides the detailed data without taking into account other factors required for the calculation of specific emissions targets, such as phase-in percentages, super-credits or eco-innovation credits.

The EEA collected and analysed data submitted by Member States for the year 2010.

2. TRENDS IN NEW PASSENGER CARS

2.1. Data processing

All Member States have submitted data for new passenger car registrations for the reporting year 2010 according to the requirements of the Regulation (EC) No 443/2009: 13 Member



States met the deadline of the 28^h of February; all the Member States delivered data within six weeks after the deadline.

As this was the first year of reporting using a new reporting format, certain delays could be expected. However, in view of the strict timetable for the processing of the data, the Commission expects that for next year the deadline of 28th of February will be complied with by all Member States .

Data were submitted in the Central Data Repository (CDR) managed by the EEA. Several quality checks (automatic and manual) were performed in order to evaluate the accuracy and the quality of the dataset:

- Completeness and accuracy of parameters;
- Identification rate of the selected parameters;
- Data plausibility and outliers;
- Assignment to manufacturer using a harmonised denomination;
- Data variability (for the same vehicle, an estimate of the variability of the mass, emission and engine capacity were developed)
- Handling of unknown, individual approval vehicle (IVA)¹ and national small series (NSS)

These issues were addressed during the data evaluation process and the majority of them were solved without significant data losses.

Data for the time series 2001-2009 were gathered via the monitoring regulated by Decision 1753/2000/EC which was repealed by Regulation (EC) No 443/2009 in 2009. These data do not include all Member States in all years, as can be seen from the tables in Annex I. Moreover, due to changes in methodology and monitoring improvements, breaks in trends may occur.

2.2. Average CO₂ emissions from new passenger cars

The 2010 EU database contains about 287,000 records accounting for 13.2 million vehicles, including 23,730 individually approved vehicles², 674 vehicles approved under national small series rules and around 212,000 unidentified vehicles. Unidentified vehicles will not be considered for the calculation of the average specific emissions or the specific emissions targets for manufacturers, unless these vehicles are identified and notified by the manufacturer. These are vehicles for which either the manufacturer, or the weight or the CO₂ emission data are missing from the database for unknown reasons. The number of

¹ IVA contains vehicles imported from third countries or own build vehicle and individually approved, vehicle NSS are vehicles approved nationally in small series.

² Some Member States has included IVA and NSS in the database while some other Member States reported separately. Not all the IVA and NSS are included in the database.



registrations in EU-27³ has increased constantly between 2001 and 2007 (calculated on the basis of available MS data, see table 1 in Annex I) and decreased since 2007 (15.5 million vehicles registered).

The EU-15⁴ accounts for the vast majority of registrations of new passenger cars in the Union with a share of almost 95% in total registrations. It is worth mentioning that second-hand vehicles are not included in the database. Among the EU-15, France, Germany, Italy, Spain and United Kingdom account for 81% of the registrations.

According to the data collected, average CO₂ emissions for the EU27 are currently 140.3 gCO₂/km (Figure 1). It should be stressed that the data are still provisional and the final figures will be made available by Commission on 31st October. Average specific emissions of CO₂ have decreased by some 5.4 gCO₂/km, or 3.7%, compared to the previous year (145.7 gCO₂/km in 2009). The average emission reduction can be partly due to the dieselisation of the fleet and a slightly improved efficiency of diesel vehicles compared to gasoline ones.

Diesel vehicles represent 51.3% of the vehicle fleet against 45.1% of 2009. The average CO₂ emissions of vehicles decreased by nearly 6 gCO₂/km (diesel), and 5 gCO₂/km (gasoline) compared to 2009. The difference between average CO₂ emissions of new diesel and new gasoline vehicles is 3.3 gCO₂/km, a significant decrease since the last decade when this gap was 17 gCO₂/km.

Alternative fuel vehicles (AFV) remained stable in terms of their share and specific emissions of CO₂. On the basis of the monitoring data it is possible to report CO₂ emissions for different fuels types used by alternative fuels vehicles (Table 3). For pure electric vehicles no exhaust emission occurs (specific CO₂ emissions is 0 g/km). Amongst the others, LPG and CNG (liquefied petroleum gas and natural gas) fuelled cars have the lowest CO₂ emission (below 125 g CO₂/km).

Table 1: Average CO₂ emissions from new passenger cars by fuel (EU27⁵)

gCO₂/km	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010⁶
All fuels	172.2	169.7	167.2	165.5	163.4	162.4	161.3	158.7	153.6	145.7	140.3
Petrol	177.4	175.3	173.5	171.7	170	168.1	164.9	161.6	156.6	147.6	142.6
Diesel	160.3	159.7	158.1	157.7	156.2	156.5	157.9	156.3	151.2	145.3	139.3
AFV	208	207.4	179.2	164.7	147.9	149.4	151.1	140	137	125.8	125.7

³ EU27 includes Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and UK.

⁴ EU15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK

⁵ The geographical scope of the data changes over time from EU 15 to EU 25 and EU 27, see Annex I for details

⁶ The calculation for year 2010 was done without considering IVA and NSS vehicles



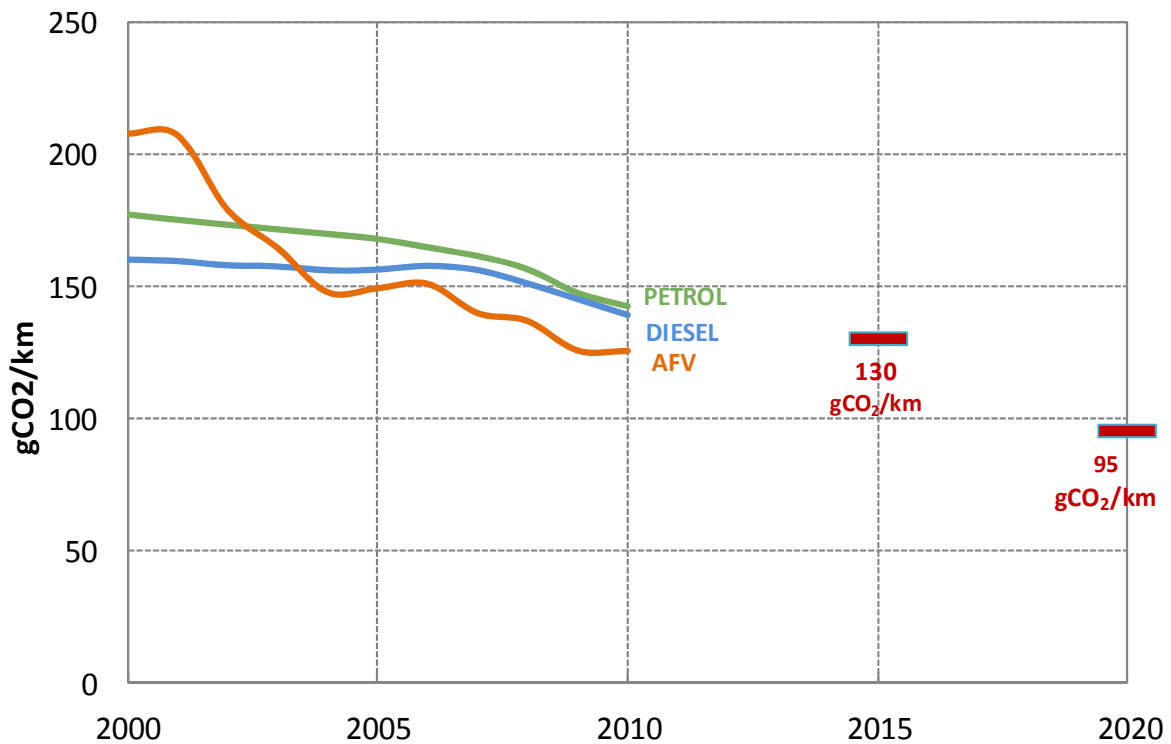
Table 2: Share of fuel type in new passenger cars (EU27⁷)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Petrol	68.9	64.0	59.2	55.5	51.9	50.7	49.4	47.3	47.4	51.1	45.3
Diesel	31.0	35.9	40.7	44.4	47.9	49.1	50.3	51.9	51.3	45.1	51.3
AFV (inc.electric)	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.7	1.3	3.8	3.5

Table 3: AFV data: registration, CO₂ emission⁸ [g/km], mass [kg] and engine capacity [cm³]

	Registration	Average CO ₂ emission	Average mass	Average engine capacity
E85	13216	172.2	1431	1741
Pure electric	674	0.0	1161	-
LPG	359252	125.2	1161	1312
NG-biomethane	78929	122.7	1325	1396
Biodiesel	52	129.7	1366	1943

Figure 1: Evolution of CO₂ emissions from new passenger cars by fuel (EU27⁹)



⁷ The geographical scope of the data changes over time from EU 15 to EU 25 and EU 27, see Annex I for details

⁸ Only exhaust emissions are considered. The calculation was done without considering IVA and NSS vehicles.

⁹ The geographical scope of the data changes over time from EU 15 to EU 25 and EU 27, see Annex I for details



From 2009 the decrease of CO₂ emissions from new passenger cars is greater in the EU-12 than in the EU-15 (6.0 g CO₂/km in EU-12 compared to 5.3 g CO₂/km in EU-15). In 2010 the average new passenger car in EU-15 emitted 7.9 g CO₂/km less than the average vehicle in the EU-12 (table 4). The higher penetration of gasoline vehicles in the EU12 can partly explain the higher CO₂ average emissions. However, it is not clear at this stage if this can also be attributed to a permanent behavioural change of citizens in the EU15, or if this is one of the effects of the financial and economic crisis.

Table 4: Average CO₂ emissions (g CO₂/km) from new passenger cars by region¹⁰

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU27								158.7	153.6	145.7	140.3
EU25					163.4	162.4	161.3	158.7	153.4	145.6	140.3
EU15	172.2	169.7	167.2	165.5	163.7	162.6	161.5	158.8	153.3	145.2	139.9
EU12								157.8	156.8	154.2	148.2
EU10					157.2	158.1	157.3	157.7	155.6	153.0	147.9

In comparison to 2009, the number of vehicles with emissions lower than 100 gCO₂/km increased by a factor of three (Figure 2). The number of new passenger cars emitting 101-120 gCO₂/km also increased compared to the previous year, representing 29.7% of the total registrations. The number of vehicles emitting less than 140 gCO₂/km represents 61.6% of the registrations in 2010. This segment increased by more than 700,000 units in 2010.

¹⁰ EU15 includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK.

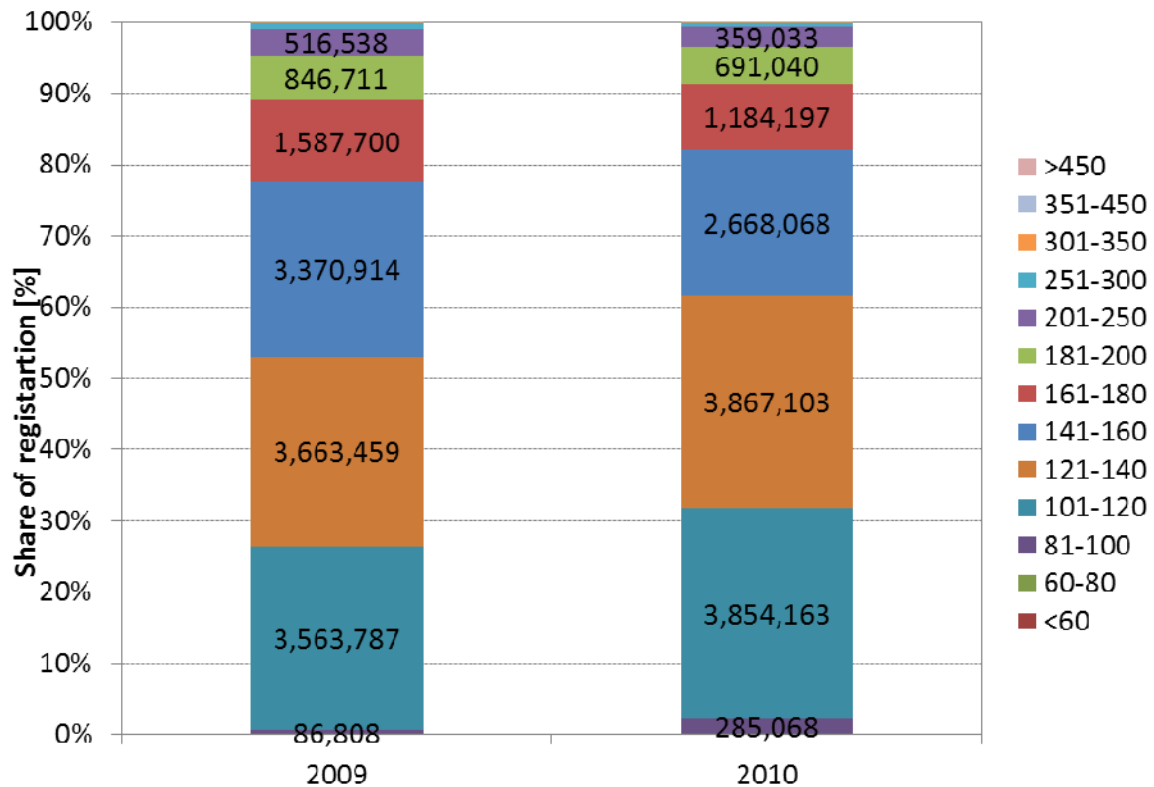
EU10 includes Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.

EU12 includes EU10, Bulgaria and Romania.

EU25 includes EU15 and EU10.

EU27 includes EU15 and EU12.

Figure 2: Number of registrations by CO₂ emissions (EU27)



In all countries, except Slovakia, CO₂ emissions from passenger cars were reduced in 2010 (Figure 3). The green bars in the figure show the absolute reduction by Member State between 2009 and 2010, while the blue spots represent the percentage variation between the same two years.

Denmark and Portugal have the lowest average CO₂ specific emissions in Europe (below 130 gCO₂/km). Bulgaria, Denmark, Greece, Ireland, Latvia, Lithuania, Netherlands and Sweden recorded the largest annual relative CO₂ emission reductions, about 8% on average compared to the previous year (Figure 4). However Member States with higher vehicle registrations – Germany, France, United Kingdom, Spain and Italy – are the major drivers of the total EU-27 CO₂ emission reduction. Among them, France and Italy have the lowest average CO₂ specific emissions. This is partly related to the relatively low average mass of the fleet (below the European average), the relatively high percentage of diesel vehicle (in France diesel vehicles represent around 70% of the new registrations) and the high presence of AFV (Italy has the highest share of LPG vehicles in Europe).

Figure 3: Absolute reduction (green bar) and the percentage variation (blue spot) by Member State between 2009 and 2010

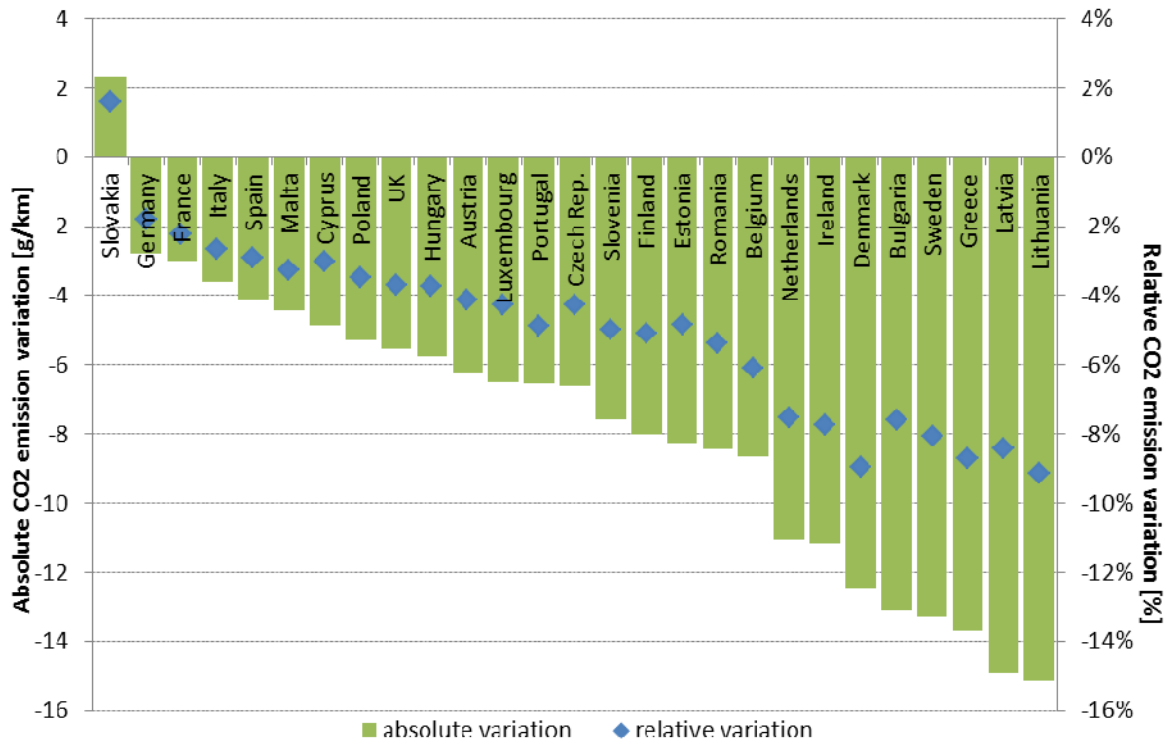
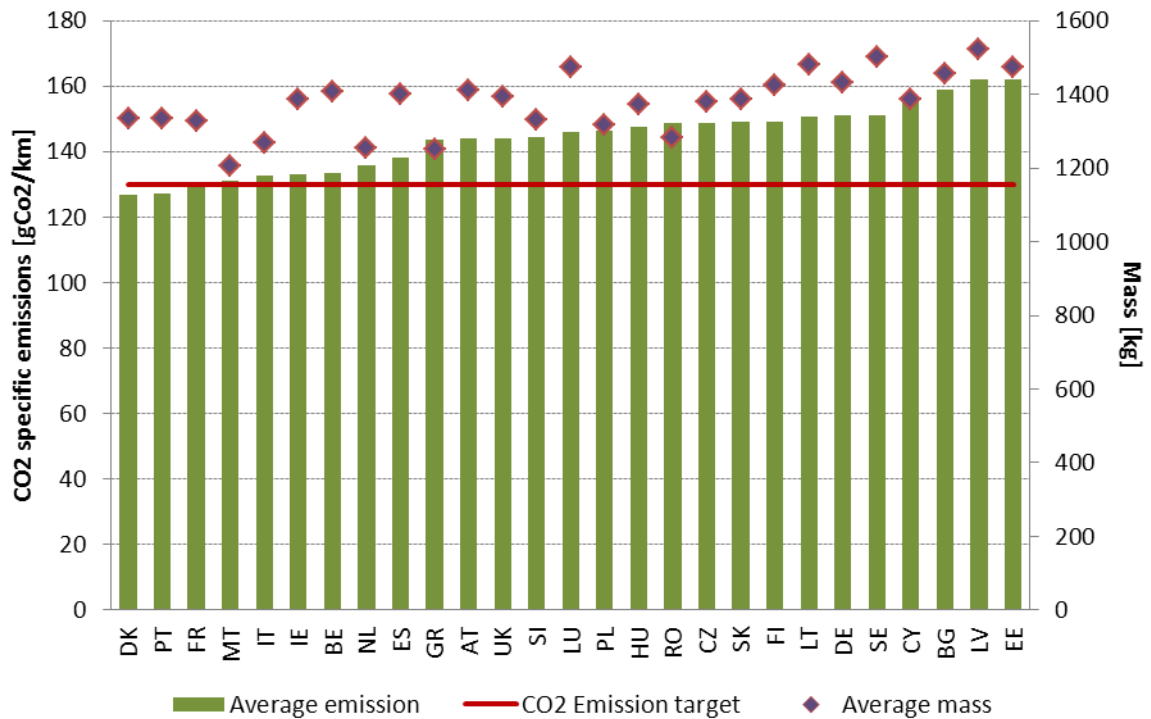


Figure 4: Average CO₂ emission and average weight by EU Member States





2.3. Other car characteristics: engine power, engine capacity and mass

The average weight of new passenger cars registered in the EU27 in 2010 increased by 28 kg compared to the previous year but it is still 8 kg below the average mass registered in 2008 (table 5). It should however be noted that the large drop in average mass that was recorded in 2009 may be indicative of the financial crisis and the associated scrappage schemes in certain countries. However the decreasing trend in mass since 2007 is continuing. The difference in mass between petrol and diesel vehicles has been increasing slowly but constantly between 2004 (226 kg) and 2009 (292 kg). This difference remained almost stable in 2010 compared to 2009.

Table 5: Average mass of new passenger cars by fuel¹¹

kg	2004	2005	2006	2007	2008	2009	2010
All fuels	1347	1356	1372	1379	1373	1337	1365
Petrol	1237	1235	1238	1235	1228	1206	1216
Diesel	1463	1479	1501	1510	1508	1498	1507
Alter. fuel	1415	1404	1392	1271	1237	1169	1203

There was a slight increase in average engine capacity compared to 2009 (Table 6). The average engine capacity of new diesel passenger cars in 2010 dropped however by 25 cm³ (1.4%) while the capacity of petrol powered vehicles remained constant in 2010. The difference among new diesel and petrol vehicles decreased to around 352 cm³ while 10 years ago there was 421 cm³ of difference between new diesel and gasoline vehicles. While the engine capacity increases for AFV in 2010 compared to 2009, these vehicles still register the biggest drop in this parameter in the available timeseries.

Table 6: Average engine capacity of new passenger cars by fuel¹²

cm3	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
All fuels	1714	1731	1743	1730	1726	1724	1729	1703	1620	1633
Petrol	1560	1570	1572	1571	1573	1561	1556	1531	1454	1454
Diesel	1981	1961	1948	1904	1886	1885	1892	1869	1832	1807
AFV	1602	1672	1628	1581	1561	1562	1424	1387	1328	1349

¹¹ Data before 2004 are not shown due to incomplete dataset.

¹² The geographical scope of the data changes over time from EU 15 to EU 25 and EU 27, see Annex I for details

3. Data quality

Significant efforts have been made during the last 10 years in order to improve the quality of the monitoring and the data. The increased use of official documents as common data sources, such as type approval documentation (TAD) and Certificates of Conformity (CoC), has resulted in more accurate values being recorded and reported.

It is expected that the scrutiny by manufacturers of the data will contribute to removing errors and ensure that the specific emissions targets will be calculated on the basis of high quality data.

Continuous effort will be put into improving the monitoring system, particularly to address shortcomings identified in the present monitoring systems, such as a lack of unique identification of the vehicles or variability of emission and mass. A closer collaboration with Member States will ensure an improvement in the quality of the dataset.



Annex I

Table 1 - Registration of new passenger cars by Member State [in thousands]

'000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	295	280	300	311	308	309	298	294	319	328
Belgium	497	468	459	485	480	526	525	536	475	551
Bulgaria							86	91	21	14
Cyprus				20	18	20	25	24	16	15
Czech Rep.				115	105	107	126	134	159	165
Denmark	97	113	102	124	147	154	160	148	111	151
Estonia				17	20	25	31	24	10	10
Finland	106	113	145	141	146	143	123	137	89	109
France	2228	2120	1988	1996	2059	1986	2050	2037	2259	2250
Germany	3342	3122	3237	3267	3319	3445	3126	3067	3786	2873
Greece	245	242	203	264	274	279	294	279	221	140
Hungary				230	199	193	167	163	66	43
Ireland	117	152	146	154	171	177	186	151	56	89
Italy	2430	2278	2244	2264	2237	2325	2494	2163	2160	1954
Latvia				11	16	25	31	19	5	6
Lithuania				9	11	15	21	22	7	7
Luxembourg	22	44	44	48	49	51	51	52	47	50
Malta				4	7	6	6	5	6	4
Netherlands	526	507	487	479	452	478	494	493	396	480
Poland				297	230	223	264	305	221	219
Portugal		232	194	202	208	199	204	215	159	223
Romania							313	286	115	94
Slovakia					45	65	65	57	70	65
Slovenia				37	64	62	69	72	60	60
Spain	400	969	1319	1606	1640	1622	1606	1165	964	976
Sweden	223	249	257	260	269	278	300	248	209	277
UK	2232	2611	2558	2512	2386	2295	2390	2112	1968	2026



Table 2 - Average mass of new passenger cars by Member State [in kg]

<i>kg</i>	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	1314	1335	1426	1432	1435	1449	1445	1431	1385	1410
Belgium	1288	1319	1361	1375	1396	1407	1423	1425	1406	1406
Bulgaria										1456
Cyprus				1205	1277	1316	1354	1372	1367	1388
Czech Rep.				1704	1242	1247	1261	1275	1335	1380
Denmark		1306	1325	1327	1324	1328	1370	1320	1313	1335
Estonia				1349	1408	1433	1465	1456	1471	1473
Finland	1752	1759	1336	1355	1381	1401	1437	1442	1447	1426
France	1254	1280	1305	1327	1341	1349	1375	1387	1326	1326
Germany	1332	1352	1381	1408	1412	1424	1433	1425	1347	1433
Greece	1172	1223	1262	1277	1287	1304	1314	1311	1423	1252
Hungary				1182	1203	1237	1264	1288	1330	1371
Ireland	1248	1276	1265	1314	1341	1372	1441	1440	1440	1385
Italy	1604	1632	1649	1259	1277	1294	1287	1285	1255	1269
Latvia				1452	1445	1468	1502	1498	1535	1522
Lithuania				1433	1448	1483	1481	1467	1486	1481
Luxembourg	1834	1851	1442	1471	1487	1504	1498	1490	1462	1473
Malta								1317	1182	1204
Netherlands	1260	1264	1301	1314	1337	1332	1350	1324	1295	1254
Poland				1181	1242	1271	1304	1260	1261	1317
Portugal		1229	1254	1295	1329	1352	1365	1352	1344	1333
Romania							1268	1286	1291	1281
Slovakia					1174					1386
Slovenia				1246	1305	1316	1340	1350	1346	1332
Spain	1266	1725	1317	1335	1374	1395	1416	1400	1394	1401
Sweden	1448	1454	1472	1467	1470	1488	1503	1488	1490	1500
UK	1347	1356	1392	1387	1374	1390	1394	1380	1358	1392

Table 3 - Average CO₂ emissions from new passenger cars by Member State

<i>gCO₂/km</i>	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria	165.6	164.4	163.8	161.9	162.1	163.7	162.9	158.1	150.2	144.0
Belgium	163.7	161.1	158.1	156.5	155.2	153.9	152.8	147.8	142.1	133.4
Bulgaria							171.6	171.5	172.1	159.0
Cyprus				173.4	173	170.1	170.3	165.6	160.7	155.8
Czech Rep.				154	155.3	154.2	154.2	154.4	155.5	148.9
Denmark	172.9	170	169	165.9	163.7	162.5	159.8	146.4	139.1	126.6
Estonia				179	183.7	182.7	181.6	177.4	170.3	162.0
Finland	178.1	177.2	178.3	179.8	179.5	179.2	177.3	162.9	157	149.0
France	159.8	156.8	155	153.1	152.3	149.9	149.4	140.1	133.5	130.5
Germany	179.5	177.4	175.9	174.9	173.4	172.5	169.5	164.8	154	151.2
Greece	166.5	167.8	168.9	168.8	167.4	166.5	165.3	160.8	157.4	143.7
Hungary				158.5	156.3	154.6	155	153.4	153.4	147.6
Ireland	166.6	164.3	166.7	167.6	166.8	166.3	161.6	156.8	144.4	133.2
Italy	158.3	156.6	152.9	150	149.5	149.2	146.5	144.7	136.3	132.7
Latvia				192.4	187.2	183.1	183.5	180.6	176.9	162.0
Lithuania				187.5	186.3	163.4	176.5	170.1	166	150.9
Luxembourg	177	173.8	173.5	169.7	168.6	168.2	165.8	159.5	152.5	146.0
Malta				148.8	150.5	145.9	147.8	146.9	135.7	131.3
Netherlands	174	172.4	173.5	171	169.9	166.7	164.8	156.7	146.9	135.8
Poland				154.1	155.2	155.9	153.7	153.1	151.6	146.4
Portugal		154	149.9	147.1	144.9	145	144.2	138.2	133.8	127.3
Romania							154.8	156	157	148.5
Slovakia					157.4	152	152.7	150.4	146.6	149.0
Slovenia				152.7	157.2	155.3	156.3	155.9	152	144.4
Spain	156.8	156.4	157	155.3	155.3	155.6	153.2	148.2	142.2	138.0
Sweden	200.2	198.2	198.5	197.2	193.8	188.6	181.4	173.9	164.5	151.2
UK	177.9	174.8	172.7	171.4	169.7	167.7	164.7	158.2	149.7	144.2